Fact Sheet B - Guidance for Investigation of Historic Fill Sites* and Licensed Landfills for Redevelopment

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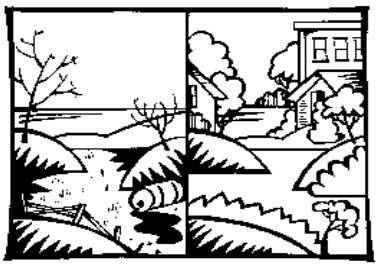

***A historic fill site is a landfill that was established before 1970 and was not licensed by the DNR**

This publication is the second of four documents in an exemption application packet for redevelopment at historic fill sites and licensed landfills. Applicants are urged to consult all three before completing the *Exemption Application for Development at a Historic Fill Site or Licensed Landfill*, the fourth publication in the packet. The other two guidance documents are:
Fact Sheet A - Guidance for Development of Historic Fill Site and Licensed Landfills, and
Fact Sheet C - Considerations for Development at Historic Fill Sites and Licensed Landfills – Potential Problems.

INTRODUCTION

This guidance provides a framework for the professional engineer or geologist who will conduct the waste and site characterization of a proposed development on or near a solid waste facility. Conclusions about this site and the proposed development will be submitted to the Department as an application for an exemption to NR 506.085, Wis. Adm. Code. The types of sites and wastes that are the subjects of this guidance will vary greatly in size, waste type, and potential impact to human health and the environment.

To address this broad range of situations, this guidance is organized to take the user through a series of steps of characterization and investigation. The results of each step of the characterization will determine, based on level of risk to human health and the environment, if progression to the next step is necessary and in what way the next step of investigation should be accomplished if it is necessary. The process outlined in the guidance is intended to be simple and straightforward for small sites with relatively innocuous waste and more comprehensive for larger sites with greater contamination potential.

This guidance is also intended to be straightforward, so the user is referred to American Society for Testing and Materials' (ASTM) standards for conducting Phase I and Phase II environmental site assessments for more detail on conducting the investigations described below. Additional information is available in "Fact Sheet Three: Step One of Conducting a Thorough Environmental Investigation: Phase I Environmental Assessment and a Phase II Scope of Work", Wisconsin Department of Natural Resources Publication Number SW-510-95, available through the Remediation and Redevelopment Program.

Because the Department will not be reviewing the site characterizations for expedited applications in detail, the professional engineer or geologist that certifies the assessments is responsible for submitting an accurate waste and site characterization that is complete to the extent

appropriate for the type of waste and the size of the site. For projects that are not eligible for the expedited exemption, we recommend that Department staff be consulted to develop an appropriate characterization plan.

FREQUENTLY ASKED QUESTIONS

Q: How can I find out more information about the waste at a property?

A: If the disposal site was licensed by the Department there will be a file that can be reviewed. You can contact the Regional DNR Waste program to make an appointment to view the file. The Department may also have limited files on sites that were not licensed. In addition, the registry of waste sites can be viewed at www.dnr.state.wi.us/org/aw/rr/brrts. If no information is available from these sources or the information is inadequate, the general process recommended in the Phase I assessment guidance could be followed.

Q: Is it mandatory that any waste found must be tested?

A: No. However, it is necessary to know enough about the waste in order to make a determination whether the waste is likely to have had a significant environmental impact and to determine if the proposed development is likely to cause an environmental impact or endanger public health and safety. In some cases it may be adequate to visually identify the waste if it is recognizable (e.g. wood and bricks from building demolition) and make that determination. In other cases there may be records of the waste disposal activities and previous testing of the waste that would allow the determination to be made. In many cases however, the waste will be unknown and some amount of sampling and testing will be necessary. It is up to the environmental professional that signs the certification statement to determine the level of testing necessary to make that determination.

Q: Do I need to make a hazardous waste determination if I don't move any of the waste off-site?

A: * NOTE: This section will be written to reflect the agreement that is reached with EPA. In general, consolidation of the waste on-site will not require a hazardous waste determination. However, if the waste is actively managed on-site or transported off-site, a hazardous waste determination may be necessary.

Q: What does active management of waste mean?

A: * NOTE: this section will be written to reflect the agreement that is reached with EPA. In general, consolidation of the waste on-site will not require a hazardous waste determination. However, if the waste is actively managed on-site or transported off-site, a hazardous waste determination may be necessary.

Q: Who is responsible for remediation activities if an environmentally significant release is discovered?

A: In general, the responsibility for remediating a release is shared by the person causing the release and the property owner. In the case of development of the site, we try to work

with all parties to accomplish both the clean up and appropriate development.

THE INVESTIGATION PROCESS

The purpose of the investigation process is to determine if there is an existing environmental impact that must be addressed, and to determine if the proposed development could cause an adverse environmental impact or a threat to public health and safety. The level of investigation will vary considerably depending on site-specific conditions and the relative risk posed by the site.

The first step in the investigation process is to gather as much existing information about the site as possible. This could include a site history, any information on file identifying the types and origins of the waste, depth to groundwater and bedrock, soil type, and distance to potential receptors such as wells and surface water bodies. A visual inspection of the site which includes digging test pits can also provide information on the quality and thickness of the existing capping soils (if any), a visual evaluation of the waste material and the extent (volume and area) of the waste placement. The next step in the process describes characterizing the waste in order to evaluate whether the waste has the potential to cause an environmental impact.

WASTE CHARACTERIZATION

Section NR 500.08, Wis. Adm. Code (WAC) lists facilities that are exempt from all requirements of NR 500 to 538, WAC. See http://www.legis.state.wi.us/rsb/code/nr/nr500.html. These facilities are exempt due to the limited potential of the waste to cause an adverse environmental impact. All facilities covered by these exemptions or issued a written grant of exemption under ch. 289, Wis. Stats.,(an exemption for low hazard wastes) are not required to apply for an exemption for development. The most common materials included in the above exemption from the solid waste rules are brick, building stone, concrete, reinforced concrete, broken pavement, and untreated and unpainted wood.

If the waste at your site can be clearly identified and the potential contaminants in the waste are known, the potential for that waste to cause an environmental impact can be evaluated without doing any sampling or testing. However, if there is any doubt as to the identification of the waste, testing should be done to confirm that elevated contaminant levels are not present. In many cases where historic fill sites are involved, the knowledge necessary to clearly identify the waste is not available. Therefore it is necessary to take representative samples of the waste for testing. In general, the types of testing that would be appropriate may include heavy metals, volatile organic compounds (VOCs), PCBs, polyaromatic hydrocarbons (PAHs), and pesticide/herbicides. If you have information about the origins of your waste, you can eliminate from the testing contaminants that are unlikely to be present.

For example, if the material in question is a non-hazardous high volume industrial waste as defined in ch. NR 538, WAC, (coal ash, foundry sand and papermill sludge) the analytes listed in Appendix 1, Table 1B, of ch. NR 538, WAC, http://folio.legis.state.wi.us/cgi-bin/om_isapi.dll?clientID=71549&infobase=code.nfo&jump=ch.%20NR%20538 can be used to characterize the solid waste. In addition the leach test advocated in Appendix 1, table 1A, should be performed to help in evaluating the contamination potential of the waste. If the waste appears to have a biodegradable component then the waste and surrounding soils should be tested for the presence of methane gas. (Please refer to the explosive gas section later in this fact sheet). Photo-ionic detectors (PIDs) can be used to screen the waste mass for VOCs to determine if further testing is warranted. Oily materials should be screened for the presence of PCBs.

The Department recommends that a minimum of one sample per 250 cubic yards of waste be collected for volumes under 1000 cubic yards to estimate the variability in the waste. For volumes greater than 1000 cubic yards, a minimum of 4 samples should be collected and the statistical procedures advocated in ch. 9 of SW-846 used to determine if the number of samples is sufficient to adequately characterize the waste. Department staff may be contacted for assistance in developing an appropriate testing program.

It is important to document the sample collection procedures and locations and include that information in the exemption application to the department.

HAZARDOUS WASTE DETERMINATION

* NOTE: this section will be written to reflect the agreement that is reached with EPA. In general, consolidation of the waste on-site will not require a hazardous waste determination. However, if the waste is actively managed on-site or transported off-site, a hazardous waste determination may be necessary.

SITE CHARACTERIZATION

The conclusions of the waste characterization will play a significant role in determining whether or not a site characterization and assessment is necessary. Conduct a site characterization when the characterization of wastes on or near the potential building site indicates that the waste contains hazardous substances that: may contaminate soil, groundwater, or surface water; or may present a human health threat through direct contact, ingestion, or inhalation, a threat to the environment, or a safety threat, e.g., explosion of methane or hydrogen sulfide gas.

The purposes of the site characterization are:

- to determine the presence or absence of contamination from the waste in environmental media;
- to determine the human health threat and threat to other potential contaminant receptors associated with the proposed site development posed by the waste and site conditions; and
- to determine the need for further site investigation to define the degree and extent of contamination and for remedial action.

Site characterization should not only determine the effects of the waste on the proposed development, but should also identify the potential impacts that the development will have on the waste and the development's potential to impact the potential receptors noted above.

EXISTING INFORMATION ABOUT THE SITE

- Document all information on the proposed site that is available before field activities are initiated. This includes all Phase I and Phase II site assessment information that is currently available, and information on all existing gas, soil, groundwater, and surface water monitoring equipment and installations at the site.

- Document information on any existing waste containment structures, such as berms, a liner, a cover, and any other designed components of the waste site, such as gas and leachate collection and management equipment. Include a description of the waste types found at the proposed development site and the waste characteristics if waste characterization information is not included in the site characterization report.

- Develop a site map depicting all appropriate existing information on the site.

WASTE LOCATION

- Develop a site map with waste areas identified and waste boundaries delineated, and depths of waste noted at regular intervals across the waste.

- Waste limits, both horizontal and vertical, can be based on existing information but should be verified through fieldwork such as borings or back hoe pits.

If a liner contains the waste, the fieldwork must not result in additional leachate migration paths through the liner. Similarly, fieldwork should not result in increased infiltration of precipitation through any existing cover on the waste.

SAMPLING PLAN

If methane, soil, surface water, and/or groundwater sampling are planned, the site owner or consultant may choose to submit a sampling plan to the Department.

A sampling plan:

- summarizes the planned activities;
- describes the environmental media to be sampled (soil, surface water, groundwater, water supply, air, etc.);
- defines the number of samples to be collected and the locations of the sampling sites;
- describes the methods to be used for the installation of the sampling equipment; and
- describes the methods for the analysis of the samples.

Department staff may provide comments on the plan, at least on aspects of the plan that are deemed missing or inadequate.

EXPLOSIVE GAS POTENTIAL

If the waste characterization indicates the potential exists for methane production by the decomposition of the waste, monitoring of the site for the presence of methane is necessary.

Monitor the soil near the waste for methane concentrations and, if present, define the extent of methane migration and determine the concentrations near and under the proposed development site. Monitor methane concentrations in the air of any existing buildings at risk for explosion potential. Gas monitoring must be done in accordance with s. NR 507.22, Wis. Adm. Code.

Gas monitoring well design and installation must comply with s. NR 507.11, Wis. Adm. Code. Choose gas well locations to fully characterize the occurrence of methane and concentrations in the vicinity of the proposed building site, in and near existing buildings, and in existing and proposed utility trenches, and for all other possible routes of gas migration. Note that bar probes may be considered as a simple way to screen a site for the presence of methane for those sites that are not expected to generate significant amounts of this gas.

SOIL CONTAMINATION POTENTIAL

If the results of the waste characterization indicate that contaminants are capable of migrating from the fill materials to adjacent soils in sufficient amounts to cause State and federal soil standards and screening levels to be exceeded, the soil must be sampled for the presence or absence of the contaminants. Choose the soil sample locations to fully define the presence or absence of soil contaminants adjacent to the limits of waste and in the vicinity of the proposed redevelopment. The number of soil samples should be sufficient to adequately characterize the risk posed by soil contamination to human health by dermal contact, ingestion, or inhalation to those using the redevelopment facilities, to construction workers at the site, and to groundwater and surface water quality. Parameters for which samples should be analyzed will be based on the parameters of concern associated with the waste(s) identified at the site.

Document information on the method used to obtain the soil samples, the sampling technique, a description of field screening or field analyses performed, and the analytical laboratory and methods used. All required Department forms must also be used, such as soil boring logs and borehole abandonment forms. This information should be included as part of the expedited approval application.

If contaminants are found in the soil that exceed applicable soil standards, notify the Department as required in s. 292.11, Wisconsin Statutes, and ch. NR 706, Wis. Adm. Code.

GROUNDWATER CONTAMINATION POTENTIAL

If the potential for groundwater and/or surface water contamination exists, as indicated either by the presence of soil contaminants or by the nature of the waste and the soil beneath it, the presence or absence of the potential contaminants in groundwater and/or surface water must be assessed. Install groundwater monitoring wells at locations to define groundwater flow conditions, to best identify the presence or absence of groundwater contaminants down-gradient from the waste, and to define background (up-gradient) groundwater quality. Parameters for which the samples should be analyzed will be the contaminants of concern

identified in the waste characterization and in the soil sample analyses.

The groundwater monitoring program can also be designed through the use of initial samples collected from direct-push technology soil borings. Generally, this method is not acceptable for obtaining representative groundwater samples. The short screen length usually used with this method can easily miss a contaminant plume. In addition, the hydraulic connection between the sampling screen and the water-bearing formation may not be adequate to provide a sample representative of groundwater quality because of sediment smearing of the boring walls, a lack of a well screen filter pack, and the difficulty or impossibility of developing the "well". The Department plans to issue an informational document on this topic in the future.

Document information, including the appropriate Department forms, on well construction, installation, and development methods used, as well as groundwater sampling technique, sample preservation method, and the analytical laboratory and methods used. This information should be included as part of the expedited approval application.

If contaminants are found in the groundwater, notify the Department as required in ch. NR 706, Wis. Adm. Code.

SOIL, GROUNDWATER, AND SURFACE WATER RESULTS

Describe the analytical results for the soil and water samples. Include a summary of the data in one or more tables and include the analytical data sheets for each sample and QA/QC results and chain of custody forms in an appendix.

INVESTIGATION RESULTS DISCUSSION

- Discuss the geologic and hydrogeologic setting, based on both the regional information available and the site-specific information obtained during the site investigation.
- Discuss the presence or absence of contaminants in soil, surface water, and groundwater and of methane gas at the site. Also discuss the observed or anticipated behavior of the contaminants in the context of the soil/bedrock/groundwater setting.
- Discuss the contaminant concentrations found, and compare them with the associated groundwater quality standards and soil standards or any suggested contaminant threshold levels if no standards exist.
- Discuss the impact that the contaminants would have on the proposed redevelopment and the impact of the redevelopment on the waste and associated contaminants.
- Discuss the implications of the identified contaminants on the proposed development and on a possible degree and extent investigation.
- Identify actions that can be completed in the design of the development to avoid or mitigate the impacts of the waste on the surrounding environment caused by the development.

- Include a site map that depicts, at a minimum, all gas and groundwater monitoring wells, soil borings, and surface water sampling locations

associated with the site, and, if applicable, a groundwater flow map with water table elevation contours. All submitted site maps must be drawn to a common scale and include a north arrow; labels and a legend should be included as appropriate.

CONCLUSIONS

Discuss the conclusions about the waste, the current impact of the waste on the environmental media in the vicinity of the waste, the level of risk to human health or welfare or the environment posed by the waste, particularly with respect to the proposed redevelopment, and the need for further investigation in accordance with ch. NR 716, Wis. Adm. Code, and for remedial action. These conclusions should reflect the statement of the professional certification regarding the absence of a release and the potential of a release of hazardous substances from waste at the site.

SITE EXAMPLES

The following is a hypothetical example that illustrates how the stepped approach recommended by this guidance might be applied to a typical situation. In the first three cases, development could be handled using the expedited exemption process. In Case #4, the site does not qualify for the expedited process and the developer should contact the Department's Remediation and Redevelopment Program about performing an investigation using the procedures specified in NR 700.

Case #1: A developer is proposing to develop a parcel of land for residential condominiums that will include basements. A phase 1 site assessment was performed and revealed that foundry wastes and demolition materials were disposed on a portion of the site. The site was never licensed as a landfill and little specific information is available regarding the extent or characteristics of the waste. The developer hires a consulting firm to perform an investigation. The consultant drills borings and digs backhoe pits to define the limits of the waste, and analyzes samples of the waste materials in accordance with the Waste Characterization section of this guidance. The waste characterization does not indicate the presence of hazardous wastes, high concentrations of contaminants, or the presence of wastes capable of producing dangerous gases such as methane, hydrogen sulfide, or others.

Case #2: Same situation described in Case#1, except that some borings yield municipal-type solid waste. The consultant performs a barhole survey for methane, and installs a couple of gas monitoring wells in an area where methane is detected by the barhole survey.

Case #3: Same situation described in Case #2, except that the results of waste characterization indicate the presence of a number of empty paint and solvent containers and VOCs are detected in some of the waste samples. The consultant decides to expand the investigation by:

1) installing a monitoring well to sample groundwater,
2) taking soil samples below the waste, and
3) sampling a couple of potable wells in the vicinity of the site.

The results of the investigation do not indicate the exceedance of any groundwater or soil standards.

Case #4: Same situation as Case #3, except that sampling results from the monitoring well indicate the presence of tetrachloroethyelene (TCE) in groundwater at concentrations above the NR 140 Wis. Adm. Code enforcement standard.

GUIDANCE CONCLUSION

The process described in this guidance for investigating proposed development sites near solid waste facilities is intended to be incremental in implementation to reflect the varying types of sites and levels of risk posed by the site and waste characteristics. A submittal of site information and waste characterization on the expedited exemption application may suffice for simple sites with waste that poses no or low risk to human health and the environment. A site characterization will be necessary for more complex sites with waste that could pose a risk to humans or the environment.